

Application No.: 10/064,830

Docket No.: JCLA9625

In The Specification:

Please amend the paragraph as number in the specification as follows:

[0025] In addition to the cost of supercapacitor related to the commercial viability of the integrated battery of the present invention, the price of the enclosed electronic controller is also a critical factor. FIG. 2 is a preferred embodiment showing a block diagram of an on-board controller 200 for guiding the compensatory actions between battery LI/B 110 and supercapacitor S/C 112. Inside the housing 201, the controller is consisted of a charge sub-controller (C) 205 and a discharge sub-controller (D) 206 for governing energy supplied through diode 204 from an input such as an AC or a DC power source, as well as for governing energy output to loads. When there is no external energy, battery LI/B provides energy with voltage adjustment, for example, 4.2V or lower is stepped up to 5.0V, by the charge sub-controller C through communication bus 202 and 203 to charge supercapacitor S/C. Battery LI/B is pre-set to discharge at no more than 1C. 1C rate means that the allowable energy of batteries is drained in 1 hour. ~~If loads demand powers more than battery LI/B can provide~~ there exists a power difference between a power demanded by a load and that provided by the LI/B, ~~the extra power need will~~ it can be supplemented by supplied a provision of ~~by~~ supercapacitor S/C via the modulation of discharge sub-controller D.

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[0026] Now, the topology of charge sub-controller C and discharge sub-controller D is explained in FIGs. 2A and 2B, respectively. FIG. 2A shows charge sub-controller C consisting of a micro-controller ($\mu C1$) denoted as 217 and three switches, SW1 (219), SW2 (221), and SW3 (223), of MOSFET (metal oxide semiconductor field effect transistor) type encased in the housing 211. During charging, a charging current is supplied by an external power source to point IN, which is regulated by micro-controller 217 through switches 219 and 221 also communication buses 215, 225, and 227 to primarily charge supercapacitor S/C 112 to its nominal cell voltage. Within the forgoing voltage, S/C 112 can accept charging currents of any a magnitude up to hundreds of Ampere. Hence, even as large as the currents generated in the regenerative braking systems of trucks can be conserved and re-used by employing supercapacitor as load leveling for the integrated battery. Once S/C 112 is fully charged and battery LI/B 110 is detected low in energy content, S/C 112 will supply energy under the command of micro-controller 217 via bus 227 and bus 215, switch 223 into bus 213 to charge LI/B 110. A double arrow is included in 223 to indicate a two-way charging between S/C and LI/B. If necessary, the charging sequence will be repeated until both S/C 112 and LI/B 110 are fully charged. By then, the charge sub-controller C will automatically disconnect the integrated battery from the external power source.

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